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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/622,540	07/21/2003	Toru Koizumi	03500.013403.1.	3894

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EXAMINER

TRAN, NHAN T

ART UNIT PAPER NUMBER

2622

DATE MAILED: 11/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/622,540	KOIZUMI ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Nhan T. Tran	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 7/21/2003 & 9/13/2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 16-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 16-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. 09/271,887.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Priority***

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 09/271,887, filed on 3/18/1999.

### ***Response to Preliminary Amendments***

2. Amendments to specification filed 7/21/2003 to include a paragraph indicating a division of application No. 09/271,887, filed on March 18, 1999 is acknowledged and accepted.
3. Currently, claims 16-23 are pending. Claims 1-15 were canceled. The Applicants state, in the remarks, that claims 16-23 correspond to former claims 7-10 and 12-14 which were restricted out the parent application as non-elected species (Figs. 7A, 7B & 8) for the feature of *the second semiconductor region being formed by a plurality of ion implantations*. The Applicants' statement is acknowledged.

### ***Information Disclosure Statement***

4. The information disclosure statements (IDS) submitted on 7/21/2003 & 9/13/2005 are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statements are being considered by the examiner.

***Specification***

5. The disclosure is objected to because of the following informalities:

It is recognized that the disclosure is submitted as original disclosure from the parent application (now US 6,661,495 B1) which contains a plurality of typo errors recognized by the certificate of correction. The applicants are requested to correct the corresponding errors in this application.

***Claim Objections***

6. Claim 16 is objected to because of the following informalities: in line 10 of claim 6, the limitation "**the** photo signal charge" should be corrected to read as – **a** photo signal charge --. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 23 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 23 recites "A method according to claim 26," which renders the claim indefinite since claim 26 does not exist.

*Note: the following art rejection applied to claim 23 is based on Examiner's best understood by assuming that claim 23 is dependent from claim 20.*

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 16 – 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Merrill (US 5,892,253) in view of Drowley et al. (US 6,023,081).

Regarding claim 16, Merrill discloses a solid state image pickup device (Fig. 3 and col. 1, lines 6-10) comprising, within a pixel thereof (pixel sensor 100 shown in Fig. 3),

a photoelectric conversion unit (light sensing unit comprising layers 114, 112 and 110 for converting light energy into signal charge as shown in Fig. 3 and col. 5, lines 62-66) including a first semiconductor region (110) of a first conductivity type (p type), a second semiconductor region (112) of a second conductivity type (n type) within the first semiconductor region, and a third semiconductor region (114) of the first conductivity type (p type) disposed at a light incident side of said second semiconductor region (see Fig. 3 and col. 3, lines 65-67 and col. 5, lines 62-66. It is noted that the first conductivity type is a **positive** (p) conductivity type and the second conductivity type is a **negative** (n) conductivity type regardless upper/lower letter cases and plus/minus suffixes of the symbols, i.e., P, p+, N, n+, etc., because both P and p+ have the same

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principle characteristics of carrying positive charges (holes) for conductivity while both N and n<sup>+</sup> have the same principle characteristics of carrying negative charges (electrons) for conductivity);

a charge transfer unit (122) for transferring a signal charge accumulated in said photoelectric conversion unit (Fig. 3 and col. 5, lines 43-54 and col. 6, lines 40-48);

a fourth semiconductor region (116) of the second conductivity type (n type) within the first semiconductor region (110) to receive the photo signal charge transferred (Fig. 3 and col. 5, lines 43-54 and col. 6, lines 40-48);

Although Merrill further teaches that the image pickup device provides a balanced blue response and reduced noise (Merrill, col. 3, lines 50-55), Merrill is *silent* about the second semiconductor region being formed by a plurality of ion implantations.

In the same field of endeavor for improving blue wavelength response and minimizing noise, Drowley teaches a solid-state image sensor (10) including a second semiconductor region of n-type (26) of a photoelectric conversion unit (14) is formed within a first semiconductor region of p-type (12) and under a third semiconductor region of p-type (37) (see Drowley; Fig. 5; col. 1, lines 45-55 and col. 2, lines 23-50, 61-63). According to Drowley, the second semiconductor region of n-type (26) is formed by a plurality of ion implantations by implanting dopants at an angle (angle 28 shown in Fig. 3) from perpendicular to the substrate (11) and toward gate (22) using a high energy implant followed by a low energy implant at an angle to ensure that the second semiconductor region (26) extends under gate (22), *thereby saving masking and other processing operations in forming the second semiconductor region (26) and the source*

*of transfer unit (MOS transistor 32). See Drowley, col. 2, lines 54-58 and col. 3, lines 35-42.*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Merrill and Drowley to arrive at the applicant's claimed invention by making the second semiconductor region using a plurality of ion implantations, thereby saving masking and other processing operations in forming the second semiconductor region and the source of the transfer unit.

Regarding claim 17, as clearly disclosed by Merrill in Fig. 3, said second semiconductor region (112) extends under charge transfer unit (122).

Regarding claim 18, also disclosed by the combined teachings of Merrill and Drowley is that the charge transfer unit is MOS transistor (see Fig. 3 of Merrill in which the control gate 122 operating in conjunction with n type wells 112 and 116 is equivalent to the MOS transistor 32 in Drowley that is formed by a part of ion implantations as analyzed in claim 16).

Regarding claim 19, all limitations of a method of manufacturing a solid state image pickup device recited in claim 19 are also met by the combined teachings of Merrill and Drowley as analyzed in claim 16.

Regarding claim 20, as analyzed in claim 16, Drowley teaches that said plurality of ion implantations are performed respectively under different ion injection conditions (high energy implant and low energy at an angle implant; see Drowley, col. 2, lines 54-58 and col. 3, lines 25-42).

Regarding claim 21, see analyzed in claim 20, Drowley discloses that the ion injection condition is a condition in an ion injection angle (angle implant).

Regarding claim 22, see the analysis of claim 20 in which Drowley discloses that the ion injection condition is a condition in an ion injection energy (high and low energy implants).

Regarding claim 23 (*Note: this rejection is based on Examiner's best understood by assuming claim 23 is dependent from claim 20 in view of the 35 USC 112 rejection above*), the combined teachings of Merrill and Drowley disclose the ion injection condition being a condition in dose of an ion injection (heavily doped) to obtain the characteristics of the image pickup device as disclosed for achieving the goals of minimizing noise and optimizing the absorption of light in the blue wavelengths as described by both Merrill in col. 8, lines 41-44 and Drowley in col. 2, lines 61-67 and col. 3, lines 61-67.

### **Conclusion**



9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nhan T. Tran whose telephone number is (571) 272-7371. The examiner can normally be reached on Monday - Friday, 8:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Ometz can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NT  
  
NHAN T. TRAN  
Patent Examiner